Congestion Charging and the role of Decision Support information

- exemplified by the Stockholm trial

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Congestion Charging and the role of Decision Support information - exemplified by the Stockholm trial

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DTU Transport
Institut for Transport

Impact

Overview

1. Background and introduction
2. Scandinavian context of sustainable transport policy and road charging schemes
3. Theory: Role of policy information and decision support
4. The Stockholm Congestion Charging experiment
    1. Background and history
    2. Main elements
    3. Results
    4. Role of information and decision support
5. Conclusions and perspectives

1.
Background and introduction

Personal background

- 1988 M. Sc. Environmental Planning, Roskilde Univ.
- 2001 Ph.D in sustainable transport, Cop. Business School
- 2006 - Senior Researcher, Technical University Denmark

Research area

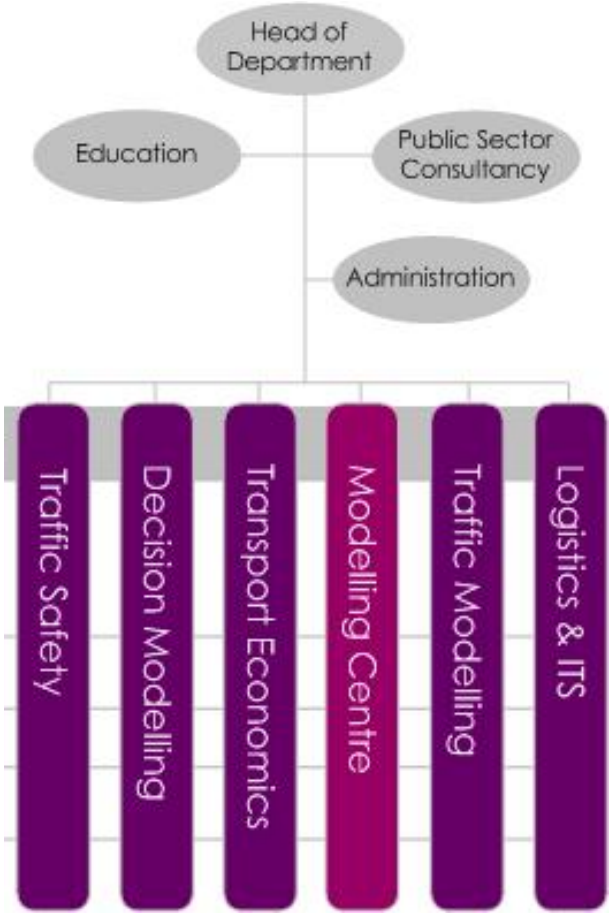
- Sustainable Transport scenarios and policy studies
- Transport Performance indicators and monitoring
- Institutional aspects of transport policy

Projects and networks

- POINT, Biofuels, Impact, DK Climate Strategy
- European Environment Agency (TERM)
- COST 356 (EST indicators)
- US TRB, Sustainability Committee, PM Committee

DTU Transport

- Institute of Transport, Technical Univ.
- Former Gov't Research Institute
- Merged with DTU in 2007
- 40 researchers, 12 Phd, 17 others
- International relations with e.g.,
  - Lund University, Sweden
  - TOI, Norway
  - ITS Leeds, UK
  - Oxford University, UK
  - Delft technical University, NL
  - Katholieke Universiteit Leuven, B
  - University of California at Berkeley, US



Research project: Impact

- a TransportMistra programme

Implementation of Sustainable Transport policies and measures,

- Transport trends are not sustainable
- Known solutions exist
- Why are they not implemented ?

-> New tools to support implementation

- Part of 'TransportMistra' program
- Funded by MISTRA Foundation, Sweden 2006-2008

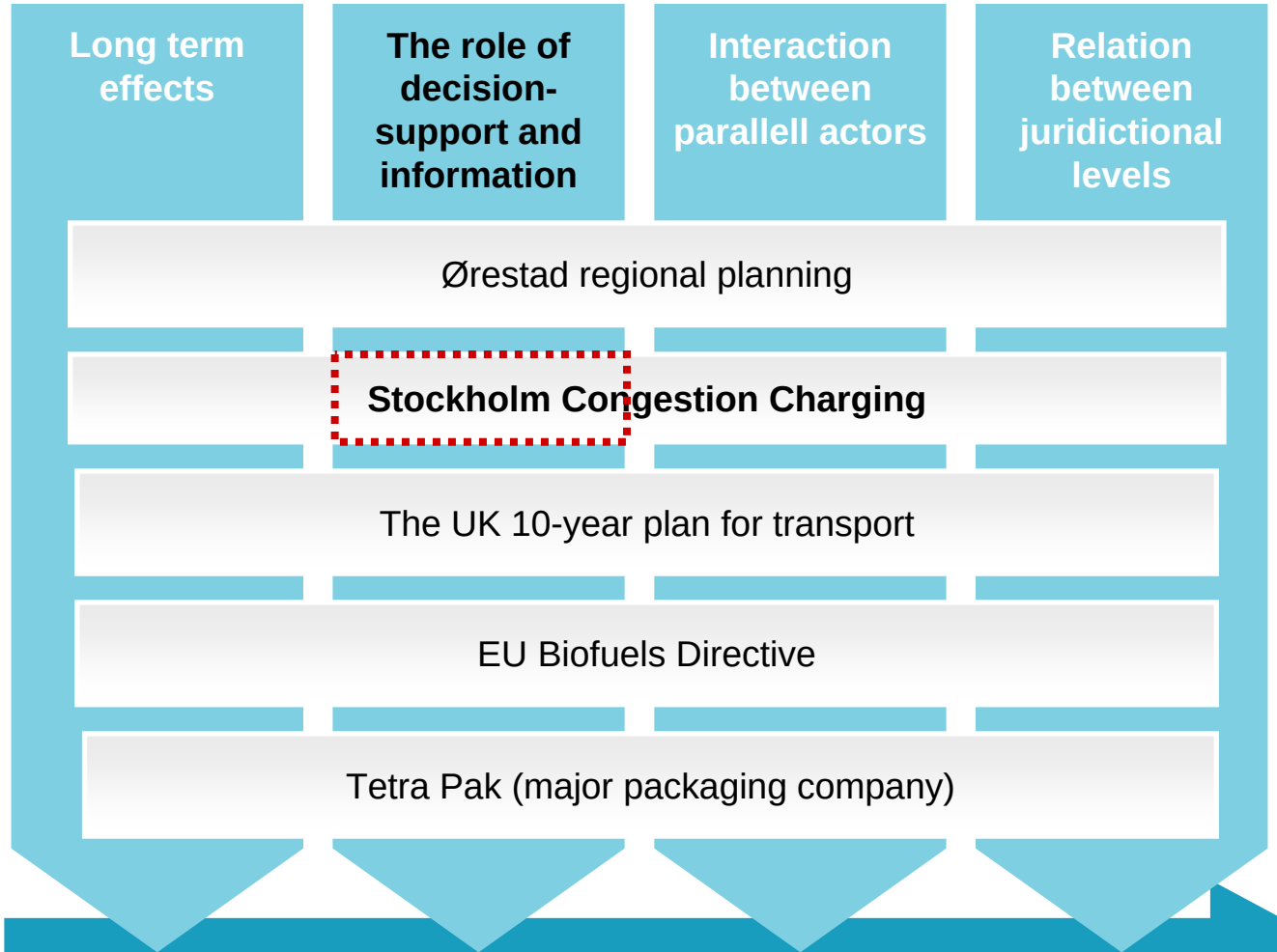
http://www.mistra.org/mobility

Research project: Impact

- a TransportMistra programme

Research Themes (WPs)

Common focal points ('cases')



Visit to Japan October 2008

Purpose:

- Collect information in Japan about experience and results with road charging experiments such as ‘Shakai-Jikken’

- Collect information about policies in Japan to reduce CO_2 emissions from transport

- Explore future research collaboration ideas on sustainable transport policy between Scandinavian and Japanese colleagues

2.
Scandinavian context of sustainable transport policy and road charging


SCANDINAVIA
JAPAN
Image NASA
©2007 Google™
Image © 2008 TerraMetrics
ointer 53°34'09.17" N 101°59'14.88" E
Streaming 100%
Eye alt 12939.02 km


SCANDINAVIA
DENMARK
SWEDEN
NORWAY
Finland
Iceland
Greenland
Faroes
Åland
Image © 2007 TerraMetrics
Image © 2007 NASA
©2006 Google™
Pointer 59°42'07.15" N 12°35'36.89" E
Streaming 100%
Eye alt 10049.06 km

Scandinavian countries - Similar aspects

General:

- Shared culture, language, history, values
- Small, wealthy, dynamic countries
- Environmental awareness

Transport:

- Low car ownership
- Free public expressway networks
- Mixed urban transport (car/PT/bicycle/walk)
- 'Sustainability' adopted in national transport policies already from 1990 onwards

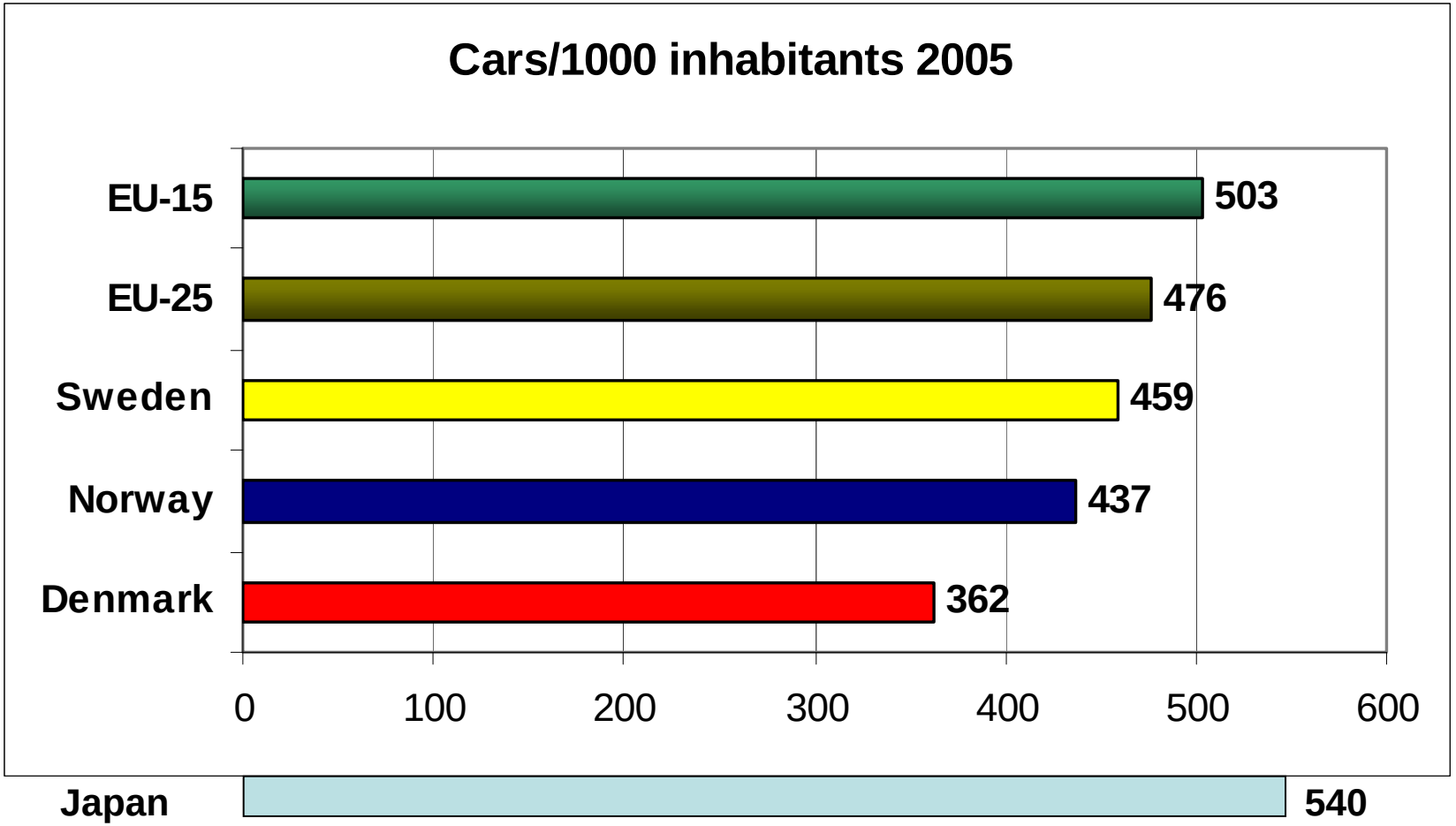
Scandinavian countries - Differences

General:

- Geography (mountains versus flat)
- Population density (low versus high)
- Denmark & Sweden in EU / Norway not in EU

Transport:

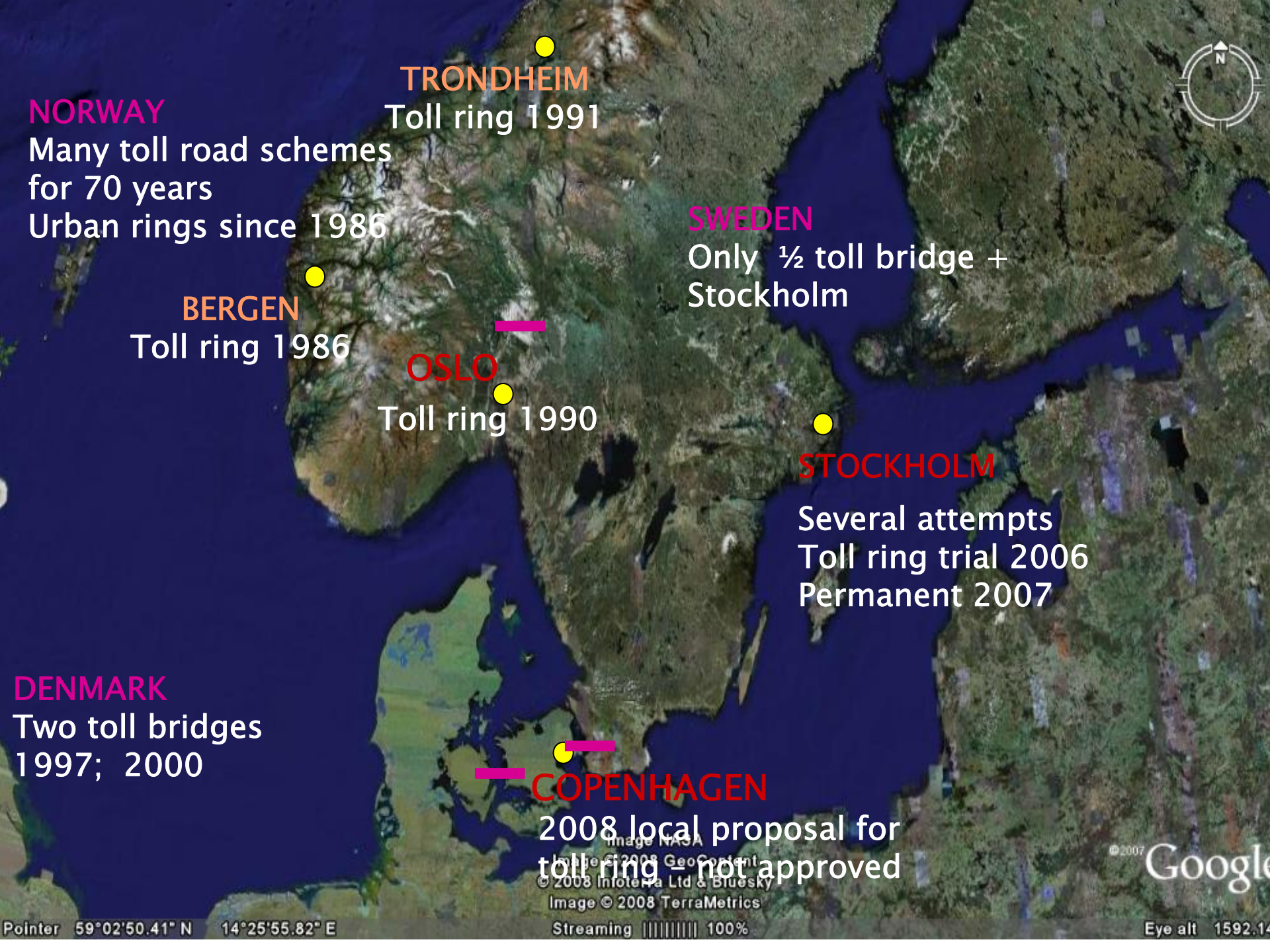
- Automobile industry (only Sweden)
- Oil production (Norway, Denmark)
- Car ownership differs among countries
- Tax systems and road charging policies differ



Source: EUROSTAT 2006

Urban 'congestion charges' worldwide

Source: AGMA 2008


TRONDHEIM
Toll ring 1991
NORWAY
Many toll road schemes
for 70 years
Urban rings since 1986
SWEDEN
Only ½ toll bridge +
Stockholm
BERGEN
Toll ring 1986
OSLO
Toll ring 1990
STOCKHOLM
Several attempts
Toll ring trial 2006
Permanent 2007
DENMARK
Two toll bridges
1997; 2000
COPENHAGEN
2008 local proposal for
toll ring – not approved
Image NASA
Image © 2008 GeoContent
© 2008 Infoterra Ltd & Bluesky
Image © 2008 TerraMetrics
Pointer 59°02'50.41" N 14°25'55.82" E
Streaming 100%
Eye alt 1592.14

Scandinavian toll charges

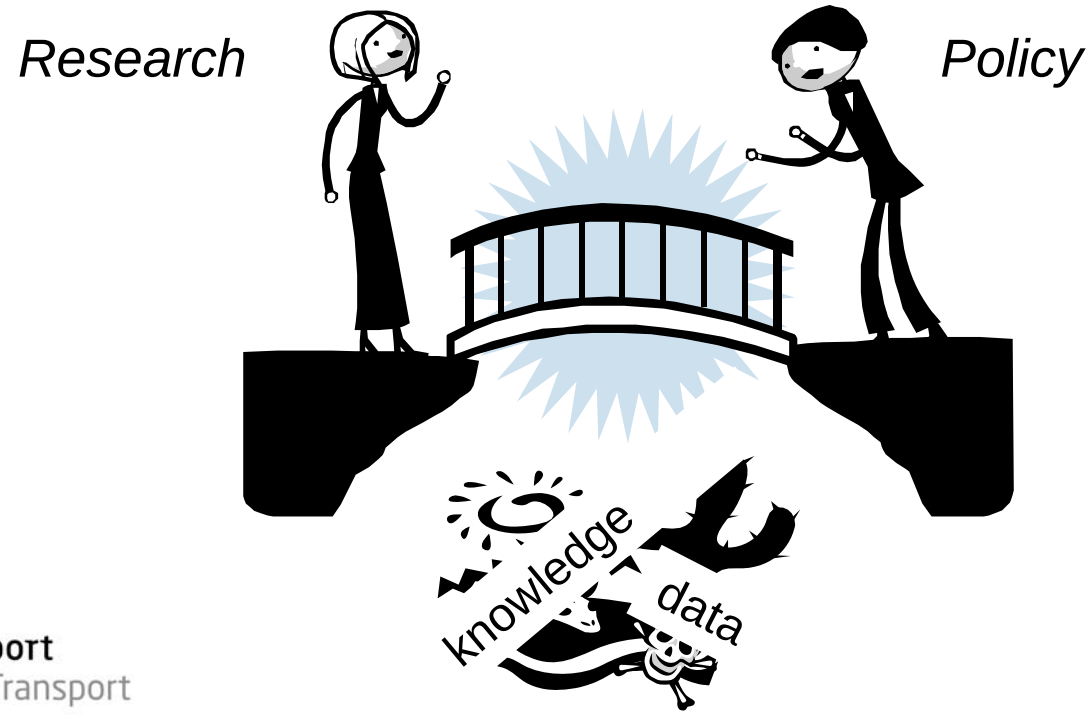
Type	Purpose	Countries
Road/brigde projects	· Finance investments	Norway (many) Denmark (1 ½) Sweden ½
Urban level	· Finance investments · Congestion · Environment	Norway (many) Denmark 0 Sweden (1)
General freeway toll for >12 tons lorries (EU) 'EUROVIGNETTE'	· Harmonize road tolls for lorries · Pay infrastructure costs (> externalities)	Denmark Sweden

Road charging in Scandinavia

From a means to finance a few special roads....

...towards an instrument for strategic transport change?

3.
The role of policy information and decision support for implementation of Sustainable Transport



Importance of Decision Support for Sustainable Transport

"Improved decision making procedures are fundamental to achieve integration of transport and environmental policies and promote sustainable development "

(European Conference of Ministrs of Transport 2003)

"[Sustainable] transport planning and policies need to be based on (and monitored by) adequate indicators, forecasts have to be developed by reliable models, and assessment methodologies have to be able to combine the social, economic and environmental targets of sustainable development"

(TRANSFORUM project 2005)

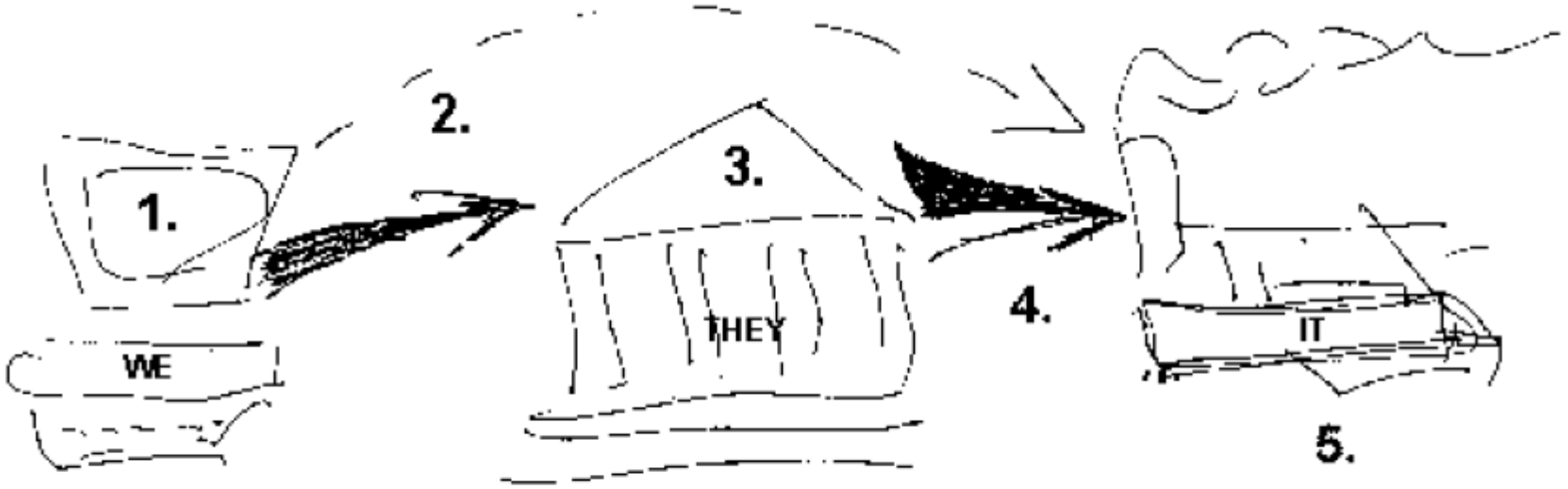
”Decision Support” definition

- Information tools and procedures,
- communicated to policy or decision makers,
- to support one or more steps in a policy process

Examples:

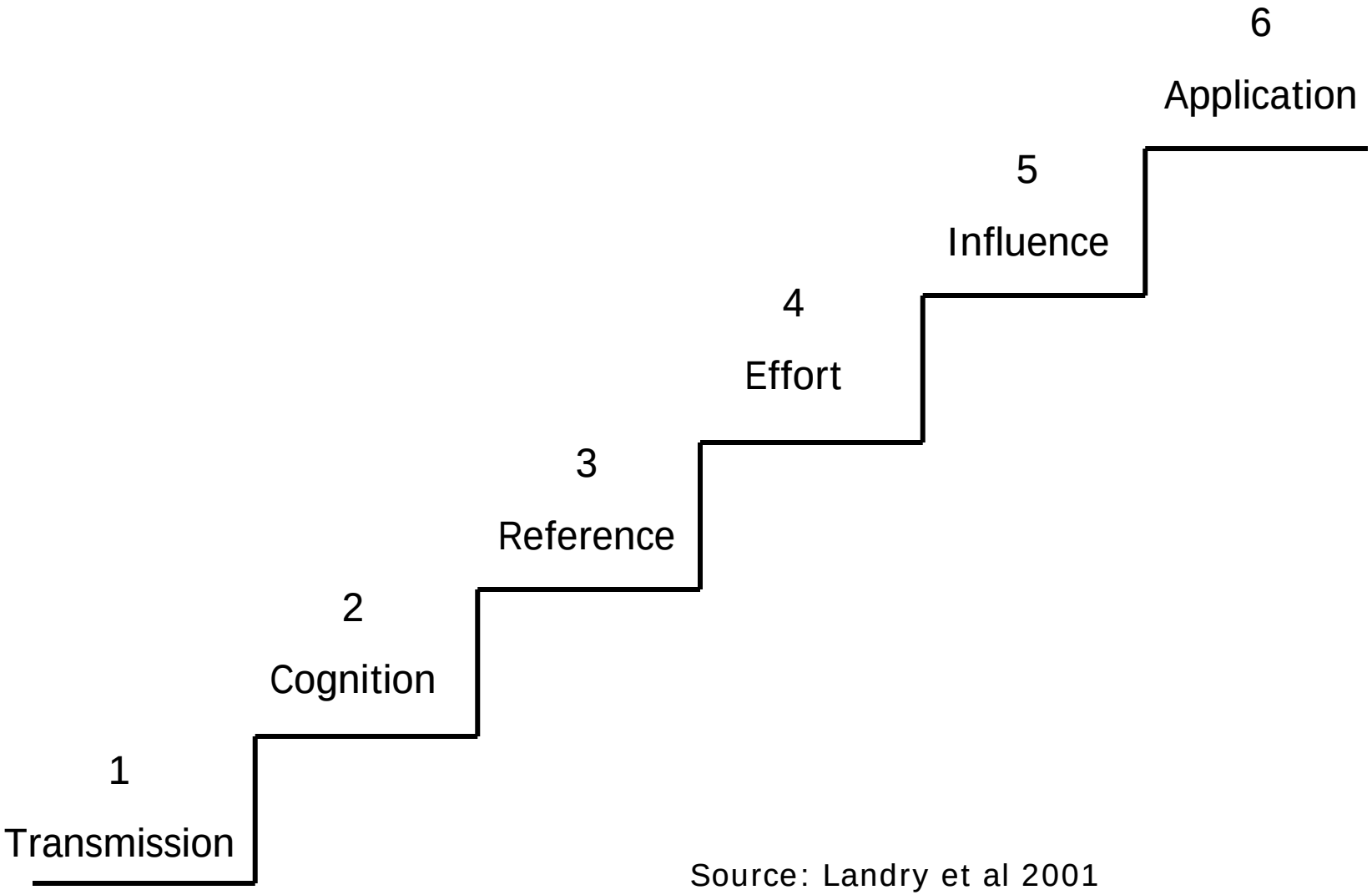
- Transport models
- Impact asessments
- Cost-benefit studies
- Monitoring systems
- Ex post evaluations
- Expert advice
- ……

Impact of Information on decisions



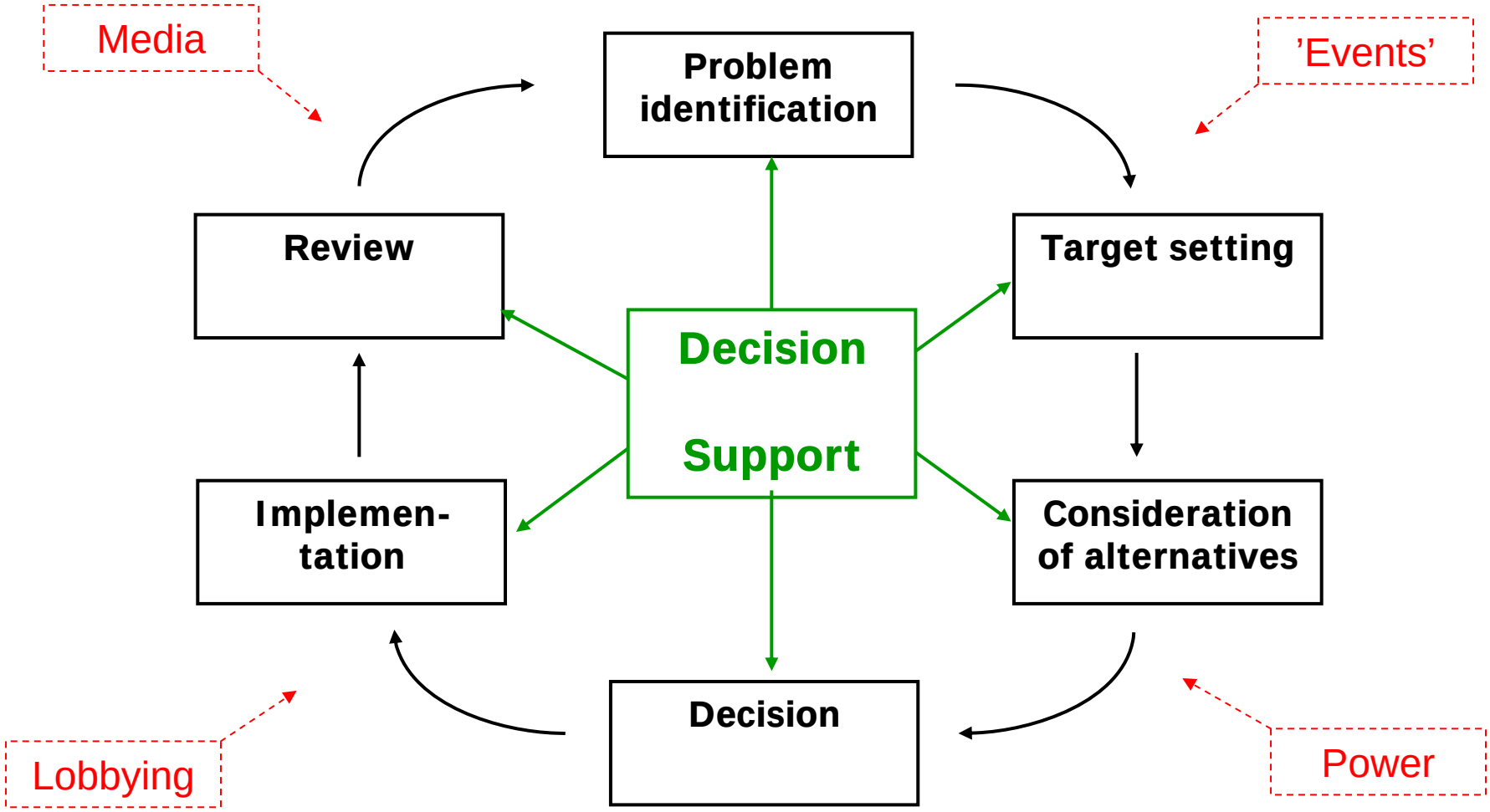
Source: GRID-Arendal 2000

’Ladder of Knowledge Utilization’



Source: Landry et al 2001

Decision Support in the 'Policy Cycle'



How is Decision Support used in practice?

Instrumental role

- To guide decision making towards appropriate action

Symbolic role

- To justify decisions or non-decisions

Tactical role

- To delay or manipulate process

Enlightenment role

- To generally inspire new ideas or ways of thinking without direct use the information

No role

- To collect dust…..

Actual role of policy information

"A substantial literature on knowledge utilization documents how little, on the whole, formal analysis and information influence decisions (...) Invisible information is most influential"

(Judy Innes 1998)

[our research...] "... confirms the hypothesis that political decision makers gather information and **do not use it**; ask for more information and **ignore it**; make decisions first and look for relevant information **afterwards**; and, collect and process a great deal of information that has little or **no direct relevance** to decisions"

(Sager & Ravlum 2005)

Influence factors for Decision Support (DS)

Conceptual factors:

- Clear idea of what is being represented and measured, a relevant 'theory' behind the Decision Support

Operational factors:

- Data quality, availability and comparability

Communicative factors:

- Dissemination, vizualisation, timing, appropriate aggregation

Institutional factors:

- Standardized information channels, links to decision processes and budgets, etc.

(inspired by Judy Innes 1990)

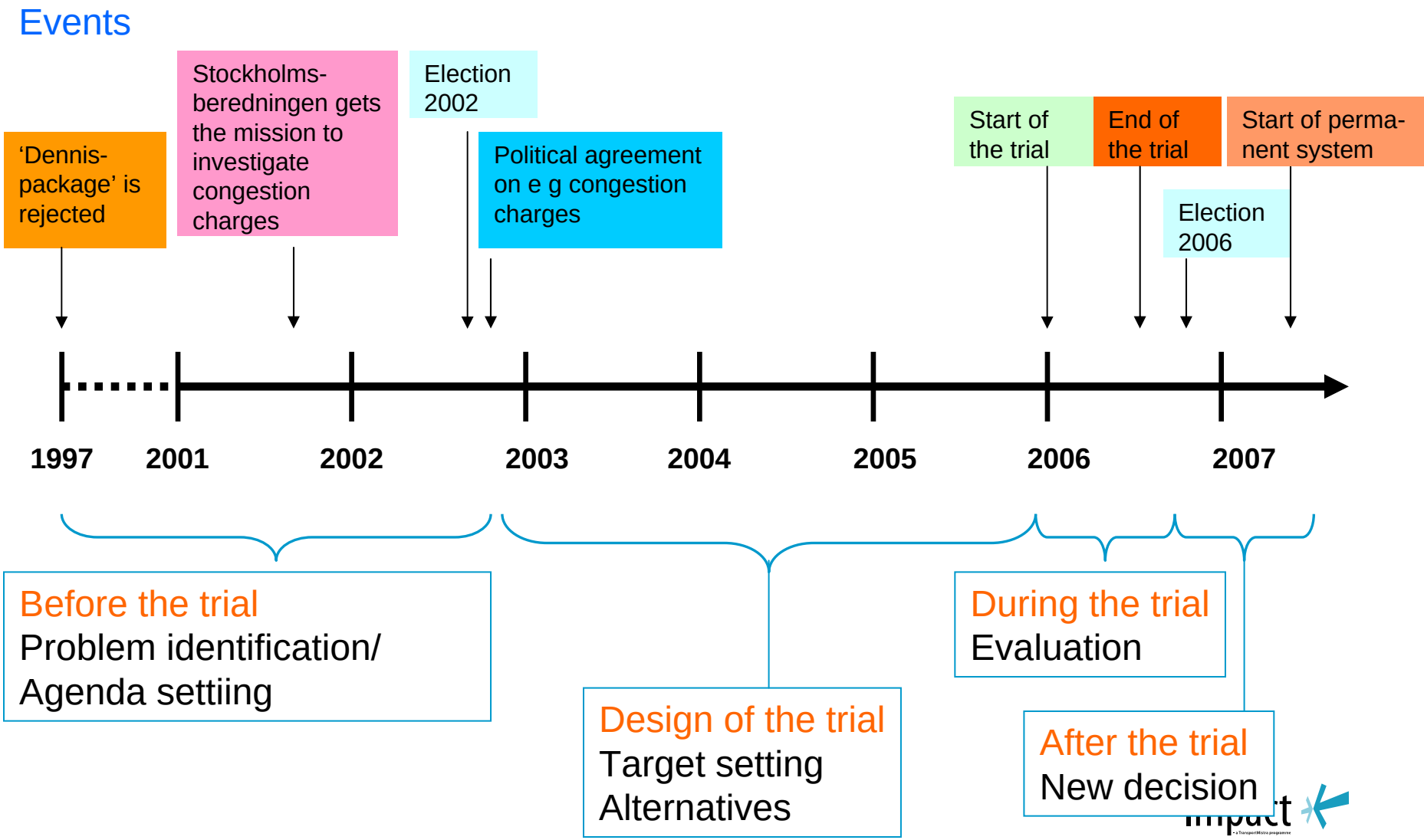
Methods for analysing DS influence

- Theory based framework and hypothesis
- Document analysis
- Interviews with key participants (experts, politicians etc)

4.
The Stockholm Concestion Charging experiment

Foto: Paul Hansen, DN

Overall timeline



Key elements of the trial (1)

- Trial period January – July 2006
- Increased Public transport Aug 2005
- Decided and paid by central gov't
- 2 (+1,8) Bill. SEK (30-60 Bill Y)
- Managed by city, region, Road adm.
- Referendum to be held (Sept 2006)

Objectives:

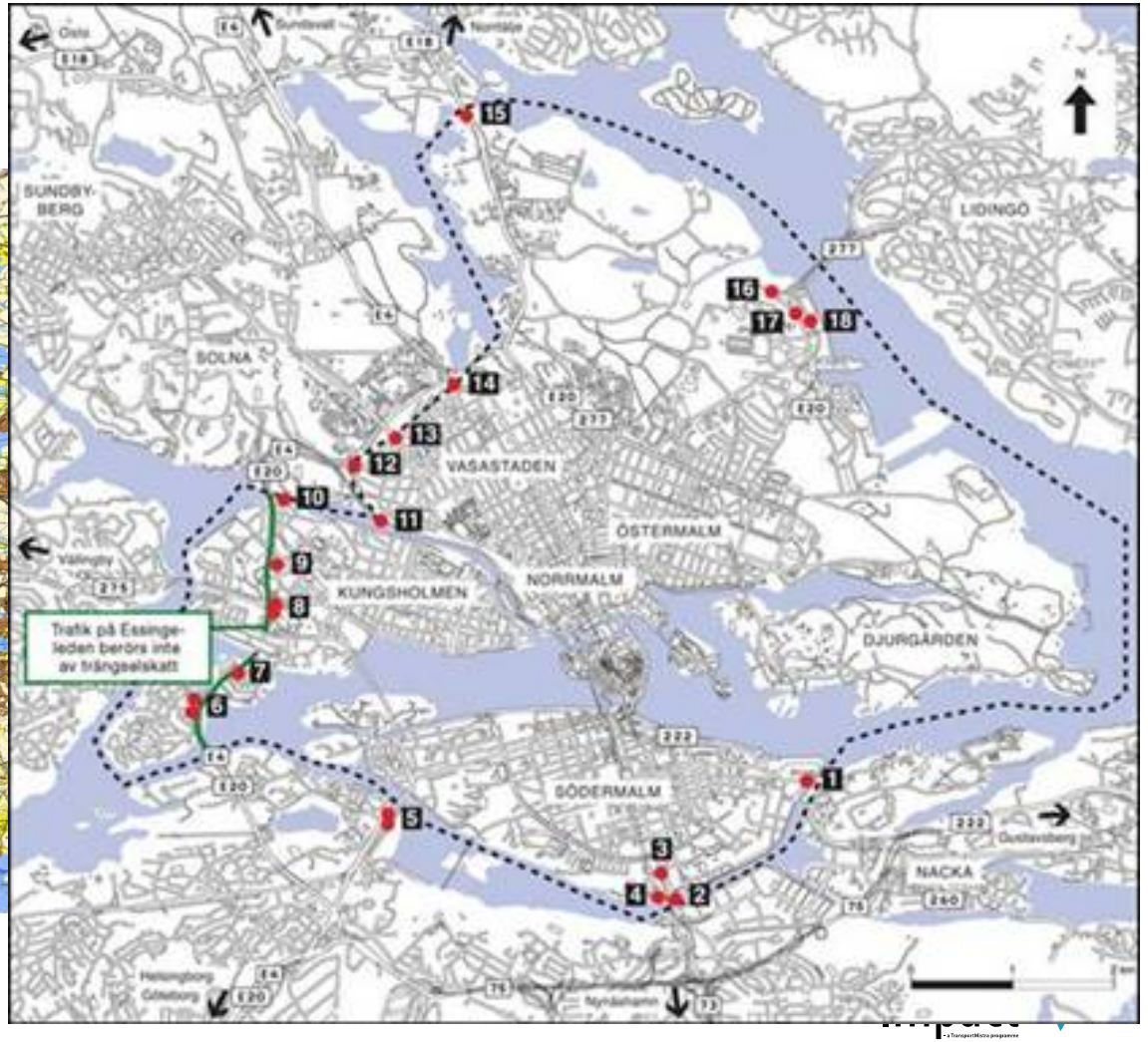
- Reduce traffic volumes by 10-15% on the most congested roads
- Increase the average speed
- Reduce emissions
- Improve the urban environment as perceived by Stockholm residents

Key elements of the trial (2)

- 34 km2 area of inner Stockholm
- Charge 6:30 – 18:30 (workdays)
- 10 ~ 20 SEK per passage (200-400Y)
- Max 60 SEK/day (1200 Y)
- Both in and out
- 18 control points

- Exempt: 'Environmental cars', taxi
- Acompanying measures: 7% increase of public transport supply (bus, rail) + Park&Ride

Area of Charging



Licence plate registration system

Camera with an infrared flash

- Takes photographs of front and rear number plates
- Number plates are identified directly in the cameras (OCR)

Source: Vägverket, Sweden

Some drivers had transponders (’ETC’)

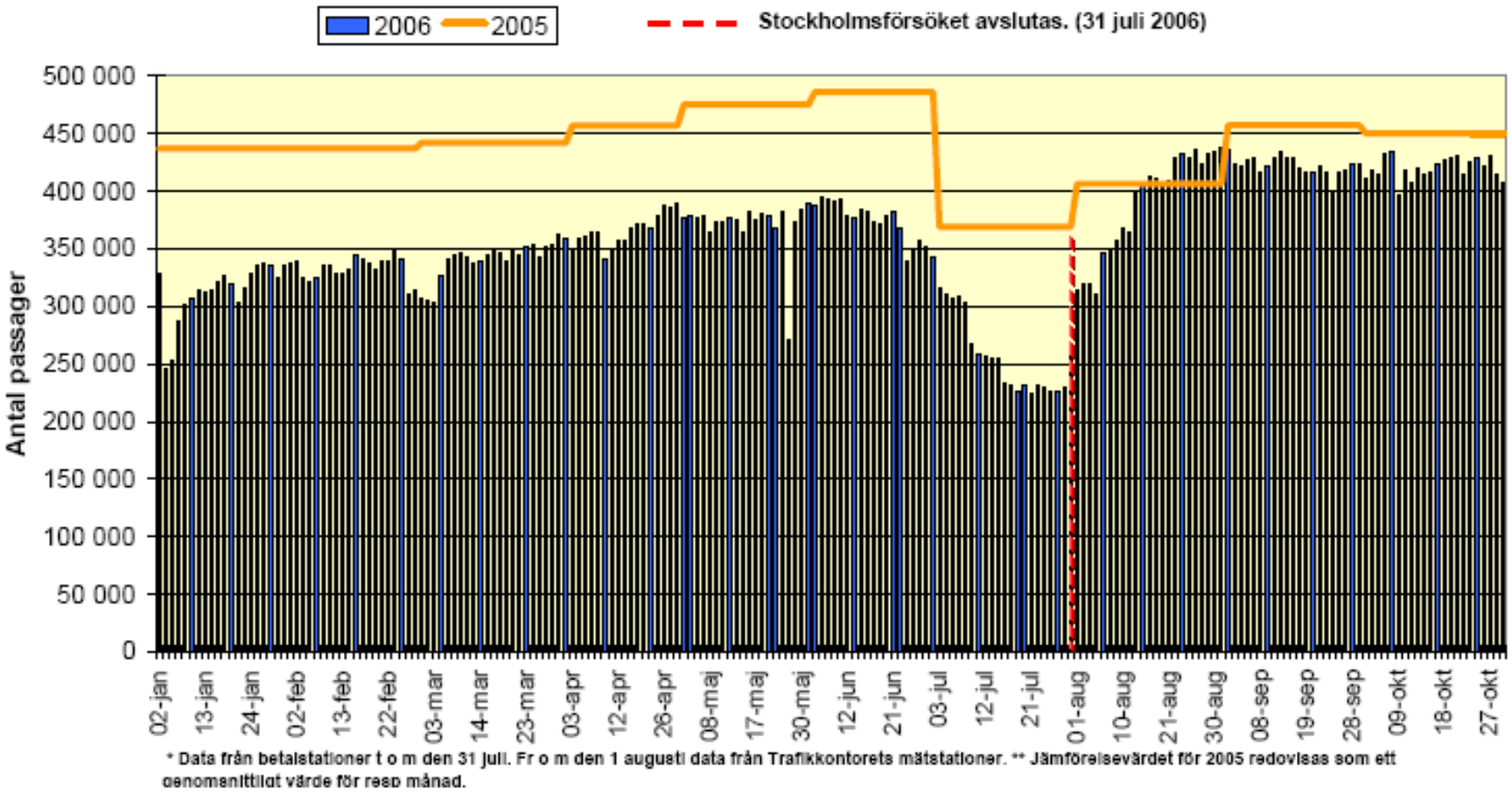
Results of the trial

- A succes on all counts + more:
- Rush hour traffic to and from the city reduced by 20-25% (car 30%, truck 13%)
- Queue time reduction 30-50% (only slight increase on a circular road)
- Reduction in the emissions of CO2 , NO and PM ca 14% (centre) and 2% (region)
- Not certain perception of environment by citizens

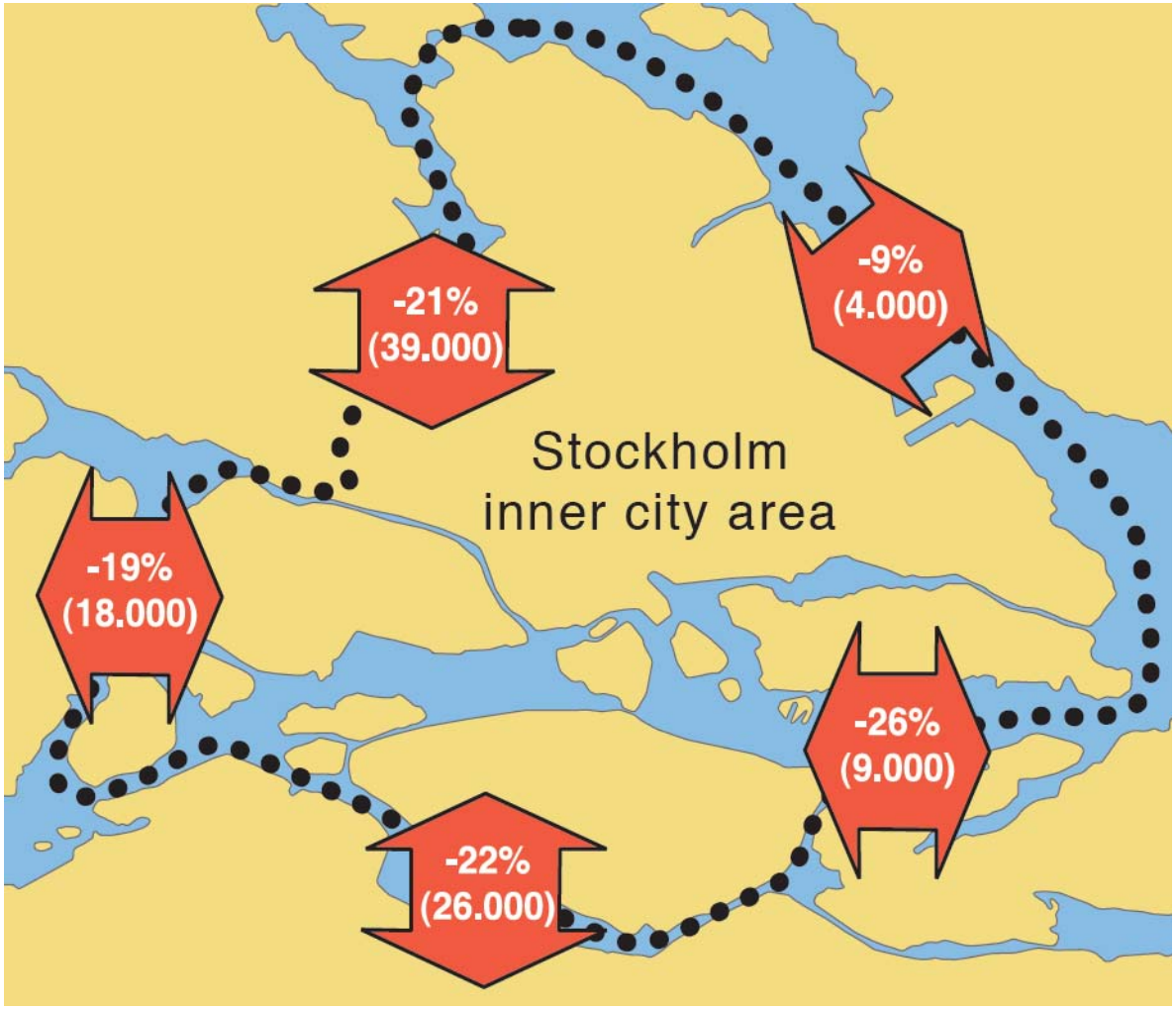
- Cost-Benefit result: Not efficient during trial only, but efficient in longer term (4 y payback)
- Change of attitude of citizens and politicians

(Source: Hugosson et al 2006)

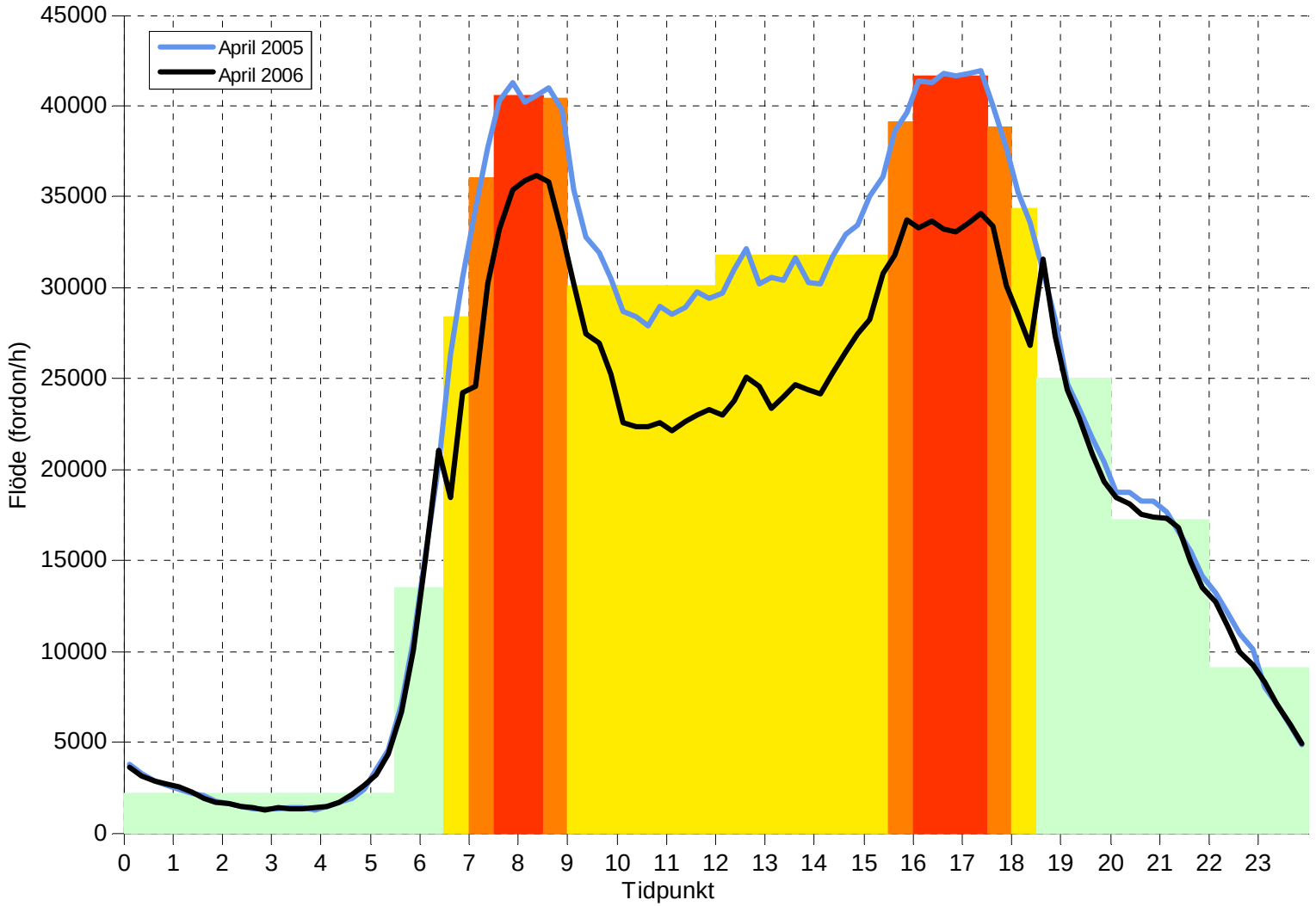
Daily number of passages 2005 and 2006



* Data från betalstationer t o m den 31 juli. Fr o m den 1 augusti data från Trafikkontorets mätstationer. ** Jämförelsevärdet för 2005 redovisas som ett genomsnittligt värde för resp månad.


-21%
(39.000)
-9%
(4.000)
Stockholm
inner city area
-19%
(18.000)
-26%
(9.000)
-22%
(26.000)

Passages to and out from the inner city



Where did the drivers go?

- Commuters mostly switched to public transport
- Vey few changed time for travel
- Some changed destination, route or simply avoided travel
- No increase in carpooling
- No increase in telecommuting

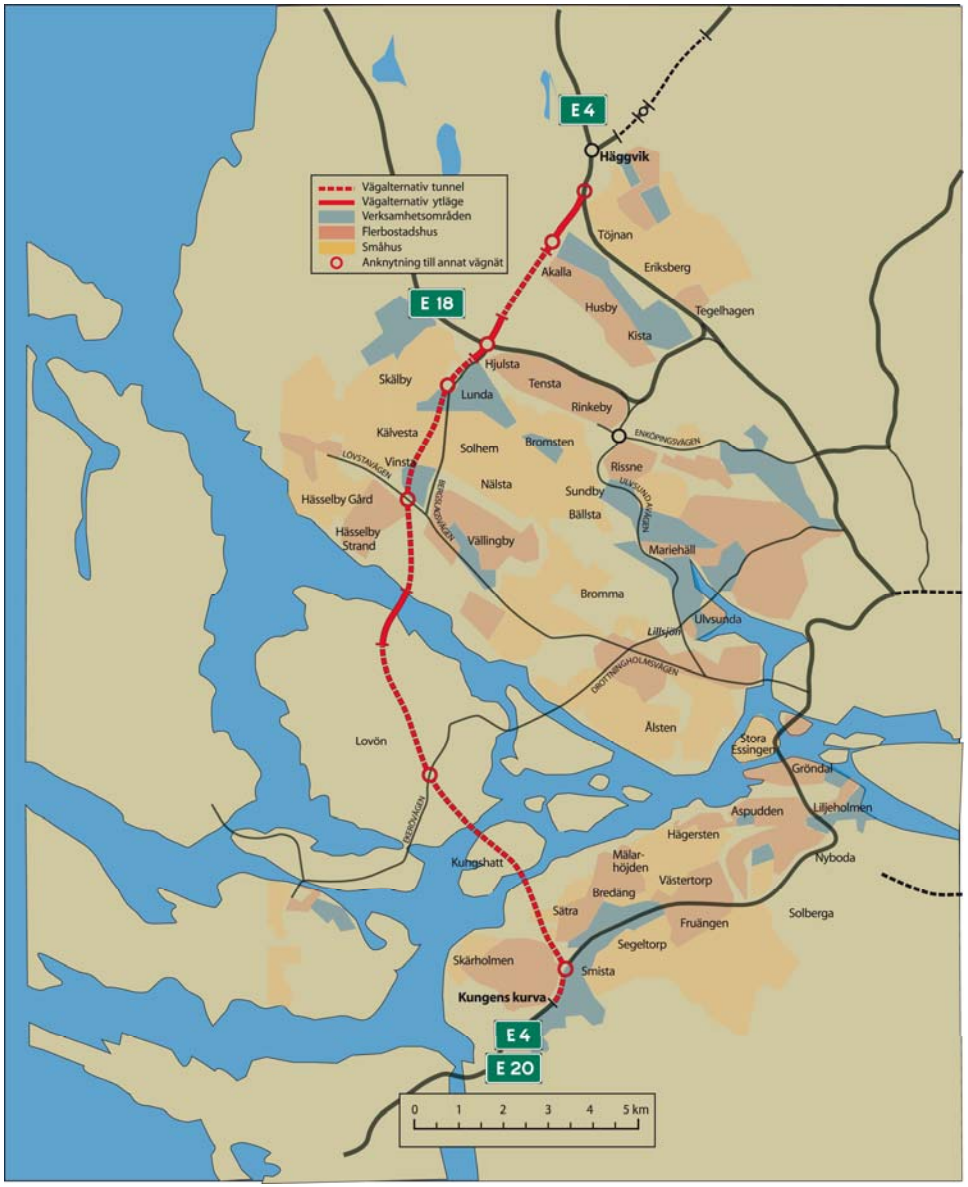
Follow-up

- Referendum held 17. sept 2007
- 'Yes' in Stockholm, 'No' in surrounding areas
- Permanent system decided and started 1 august 2007
- Similar concept as trial...

EXCEPT!

- All net revenue to be used for investments, mainly "Stockholm bypass road"
- No extra bus services
- Tax is now deductable from income
- More limited exception for 'environmental cars'

Stockholm bypass



Key 'Decision Support' elements

- Model assessments, int. reports (before trial)
- Specific studies to design elements (before trial)
- Monthly Indicator report (during trial)
  - Car travel flows and travel times
  - Public transit passengers
  - Cyclists
  - Parking space utilization
  - Retail trade effects
- Ex post full evaluation (after trial)
  - More than 30 different evaluation tasks (traffic, environment, economy, etc)
  - Scientifically designed and carried out by experts (with independent panels)

Decision support influence –interpretation

Before trial:

- Continuous flow of independent studies, repeated assessments, report from successful London case

➢'enlightenment influence' on agenda setting

Design of trial:

- A successful transport model used to specify design (time, price, PT supply, cordon location etc); Expert advice

➢possibly 'instrumental influence', on policy design

During and after trial:

- Monitoring, detailed evaluation, by independent bodies

➢ 'symbolic', and possibly 'instrumental influence' on decision to make permanent charging

’Influence factors’ during trial

Conceptua-lisation	Clearly defined measurement program for specified poliy issues, targets for key objectives
Operatio-nalization	Intensive data collection before, during, after trial, high data availability
Communi-cation	Almost instant reporting of key result indicators, extensive communication strategy, involvement of press, reference groups
Institutio-nalisation	Clear reponsibilities, relative independce of monitoring unit, requirement to use results for specified decision

5.
Conclusions and perspectives

Conclusions (1) – Road charging

- Road charging used in Scandinavia for urban areas
- Limited application so far, but possibly increasing
- Variation of purpose: finance, congestion, environment
- Successful in meeting objectives for all purposes in Stockholm
- Combination of CC and PT improvement important
- Possible to chance attitudes, support via trial

Sustainable transport implemented ?

- Too early to say, considering the changed use of revenue towards more road investments

Conclusions (2) – Use of decision support

- ’Decision support’ has played several roles in the initiation, design and outcome of the Stockholm trial
- All types of ’influence factors’ can be identified, contributng to success
- Instrumental role of decision seems detectable, at least for design details
- Decision support not always directly used
- Level of trust in information is crucial, not given

- More analysis of interviews and text needed
- Comparison with other cases could be very interesting

Selected references

- AGMA 2008 Greater Manchester Association of Governments.
  Link: http://www.gmfuturetransport.co.uk/
- City of Stockholm (2006), Facts and results from the Stockholm Trials. Final version
  Link: http://www.stockholmsforsoket.se
- ECMT (2003). Resolution No 2003/1 on Assessment and Decision Making for Integrated Transport and Environment Policy [CM(2003)4/FINAL]. EuropeanConference of Ministers of Transport, Paris
- Hultkrantz, L. et al (Forthcoming). The effects of the Stockholm congestion charging trial 2006: overview. Paper accepted for Transportation Researchpart A
- Innes, J.E. 1990. Knowledge and Public Policy. The search for meaningful indicators. Transaction publishers, New Brunswick
- Gudmundsson, H; Ericsson, E.; Hugosson, M-B; Rosqvist,L-S (forthcoming) The role of decision support in the implementation process of the Stockholm congestion charges. Accepted for Transportation Research Part A
- Landry, Réjean; Amara, Nabil & Lamari, Moktar. (2001). Climbing the Ladder of Research Utilization. Evidence from Social Science Research. Science Communication, Vol. 22 No. 4, pp. 396-422
- Richardson, T; Isaksson, K; Gullberg, A (2008). Changing frames of mobility: the Stockholm congestion tax. Paper presented at 'Trafikdage 2008'
  Available at: http://www.trafikdage.dk/papers_2008/karolina_isaksson_166.pdf
- Sager, Tore; Ravlum, Inger-Arne (2005) The Political Relevance of Planners' Analysis: The Case af a Parliamentary Standing Committee. Planning Theory (4)1 pp. 33-64
- Swedish Road Administration (vägverket). Congestion tax in Stockholm.
  Presented at: http://www.curacaoproject.eu/

Thank you – Arigato Gosaimasu!

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